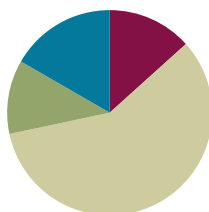


## Lesson 4

**Objective:** Add fractions with sums between 1 and 2.

### Suggested Lesson Structure

■ Fluency Practice	(8 minutes)
■ Application Problems	(7 minutes)
■ Concept Development	(35 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (8 minutes)

- Adding Fractions to Make One Whole **4.NF.3a** (4 minutes)
- Division as Fractions **5.NF.3** (4 minutes)

### Adding Fractions to Make One Whole (4 minutes)

T: I will name a fraction. You say a fraction with the same denominator so that together our fractions add up to 1 whole. For example, if I say 1 third, you say 2 thirds.

$\frac{1}{3} + \frac{2}{3} = \frac{3}{3}$  or 1 whole. Say your answer at the signal.

T: 1 fourth? (Signal)

S: 3 fourths.

T: 1 fifth? (Signal)

S: 4 fifths.

T: 2 tenths? (Signal)

S: 8 tenths.

Continue with possible sequence:  $\frac{1}{3}$ ,  $\frac{3}{5}$ ,  $\frac{1}{2}$ ,  $\frac{5}{10}$ ,  $\frac{6}{7}$ ,  $\frac{3}{8}$ .

### Division as Fractions (4 minutes)

Materials: (S) Personal white boards

T: I will say a division sentence. You write it as a fraction. At my signal, show your board and say your fraction. (Write  $3 \div 2$ .)



#### NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Depending on your group, consider supporting students visually. You may want to make “fraction cards” that show circles divided into fourths, fifths, tenths, etc. As you name each fraction, flash the corresponding card. ELLs will have a visual support to accompany language, and students performing below grade level can see how many more to make one whole.

S: (Students show  $3/2$ .) 3 halves.

T: (Write  $2 \div 3$ .)

S: (Students show  $2/3$ .) 2 thirds.

T:  $3 \div 4$ .

S: 3 fourths.

T:  $6 \div 4$ .

S: 6 fourths.

Continue with possible sequence:  $4 \div 5$ ,  $7 \div 2$ ,  $10 \div 3$ ,  $6 \div 8$ .



### NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Ask students to simplify fractions, making ones with fraction units when applicable.

## Application Problem (7 minutes)

Leslie has 1 liter of milk in her fridge to drink today. She drank  $1/2$  liter of milk for breakfast and  $2/5$  liter of milk for dinner. How many liters did Leslie drink during breakfast and dinner?

(Bonus: How much milk does Leslie have left over to go with her dessert, a brownie? Give your answer as a fraction of liters and as a decimal.)

T: Let's read the problem together.

S: (Students read chorally.)

T: What is our whole?

S: 1 liter.

T: Tell your partner how you might solve this problem.

S: (Allow for student conversations. Listen closely to select a student to diagram this problem.)

T: I see that Joe has a great model to help us solve this problem. Joe, please come draw your picture for us on the board. (Joe draws. Meanwhile ask students to support his drawing. For example, ask, "Why did Joe separate his rectangle into 5 parts?" Allow for student responses while Joe draws.)

T: Thank you Joe. Let's say an addition sentence that represents this word problem.

S: 2 fifths plus 1 half.

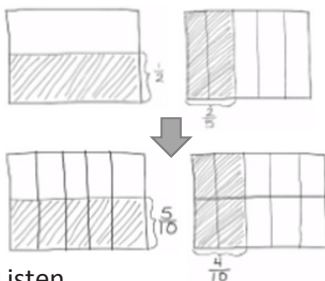
T: Why can't we add these two fractions?

S: They are different.  $\rightarrow$  They have different denominators.  $\rightarrow$  The units are different. We must find a like unit between fifths and halves.  $\rightarrow$  We can use equal fractions to add them—the fractions will look different, but they will still be the same amount.

T: Joe found like units from his drawing. How many units are inside his rectangle?

S: 10.

T: That means we will use 10 as our denominator, or our named unit, to solve this problem. Say your



$$\frac{1}{2} + \frac{2}{5} = \frac{5}{10} + \frac{4}{10} = \frac{9}{10}$$

Leslie drank  $\frac{9}{10}$  L, or 0.9 L.

$$1 - \frac{9}{10} = \frac{1}{10}$$

She had  $\frac{1}{10}$  L left, or 0.1 L.



### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

It can be helpful to ELLs to have others provide oral language to describe the models they draw. If appropriate, select an ELL to make the drawing for the class to maximize this benefit.

addition sentence now using tenths.

S: 4 tenths plus 5 tenths equals 9 tenths.

T: Good. Please say a sentence about how much milk Leslie drank for breakfast and dinner to your partner.

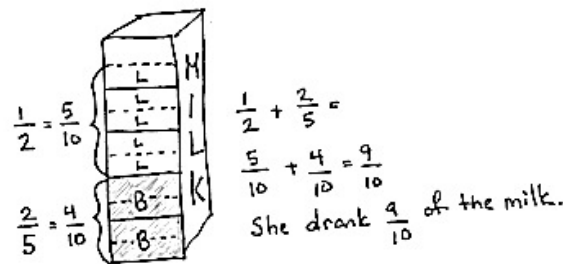
S: Leslie drank 9/10 liter of milk today for breakfast and dinner.

T: With your words, how would you write 9 tenths as a decimal?

S: Zero point nine.

T: Great. Now we need to solve the last bonus question: How much milk will Leslie have available for dessert? Tell your partner how you solved this.

S: (Possible student response) I know Leslie drank 9/10 L of milk so far. I know she has 1 whole liter, which is also 10 tenths. 9 tenths plus 1 tenth equals 10 tenths, so Leslie has 1 tenth liter of milk for her brownie.



## Concept Development (35 minutes)

### Problem 1

T: (Write or project.)

$$\frac{1}{3} + \frac{1}{4}$$

T: When you see this problem, can you estimate the answer? Will it be more or less than 1? Talk with your partner about it.

S: The answer is less than one because 1/3 and 1/4 are both less than 1/2. So if two fractions that are each less than 1/2 are added together, they will add up to a fraction less than one whole.

T: Now look at this problem. Estimate the answer.

T: (Project)

$$\frac{1}{2} + \frac{3}{4}$$

S: (Students discuss)

T: I overheard Camden say the answer will be more than one whole. Can you explain why?

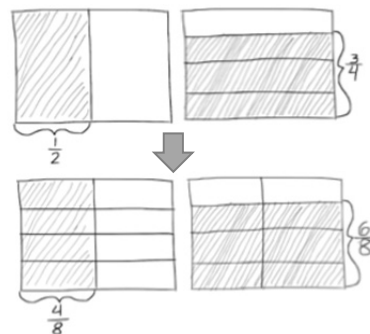
S: 3/4 is more than half and it's added to 1 half, we will have an answer more than 1 whole.

T: What stops us from simply adding?

S: The units do not match.

T: (Draw two rectangular models for students.)

T: How many parts do I need to draw for 1 half?



- S: 2.
- T: (Partition one rectangle into 2 units.) How many parts should I label to show one-half?
- S: 1.
- T: Just like yesterday, we label our picture with  $\frac{1}{2}$ . Now we will partition this other rectangle horizontally into how many rows to show fourths?
- S: 4.
- T: How many rows do we use to represent 3 fourths?
- S: 3.
- T: We bracket 3 fourths of this rectangle. Now let's make the rectangles match each other. How many parts do we need in each rectangle to make the units the same size?
- S: 8.
- T: (Partition the models.) What is the fractional value of one unit now?
- S: 1 eighth.
- T: Eighths will be our like unit. We can convert  $\frac{1}{2}$  into eighths. How many eighths are in 1 half? (Point to the 4 boxes bracketed by  $\frac{1}{2}$ .)
- S: 4 eighths.
- T: How many eighths are in  $\frac{3}{4}$ ? (Point out the 6 boxes bracketed by  $\frac{3}{4}$ .)
- S: 6 eighths.
- T: Say the addition sentence now using eighths as our common denominator.
- S: 4 eighths plus 6 eighths equals 10 eighths.

$$\frac{1}{2} + \frac{3}{4} = \frac{4}{8} + \frac{6}{8} = \frac{10}{8}$$

$$1 \text{ half} + 3 \text{ fourths} = 4 \text{ eighths} + 6 \text{ eighths} = 10 \text{ eighths}$$

- T: Good. What is unusual about our answer 10 eighths? Tell your partner.
- S: The answer has the numerator larger than the denominator. We can write it as a mixed number instead.
- T: How many eighths make 1 whole?
- S: 8 eighths.
- T: 8 eighths plus what equals 10 eighths?
- S: 2 eighths.
- T: Did anyone use another unit to express your answer?
- S: I used fourths. I know that eighths are half as large as fourths. So, 2 eighths is the same amount as 1 fourth.
- T: Can you share your answer with us?
- S: 1 and 1 fourth.

$$\frac{8}{8} + \frac{2}{8} = 1 + \frac{2}{8} = 1\frac{2}{8} \text{ or } 1\frac{1}{4}$$

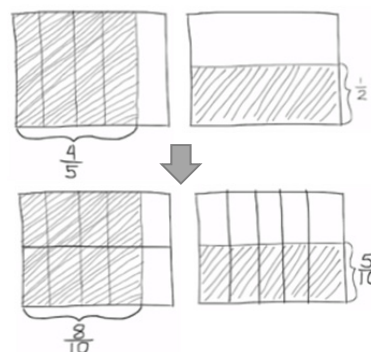
T: Let's try another.

### Problem 2

T: (Project)

$$\frac{4}{5} + \frac{1}{2} =$$

T: (Give students time to draw a model. Proceed with questioning as before to arrive at the following.)



T: Share with your partner how to change 13 tenths into a mixed number.

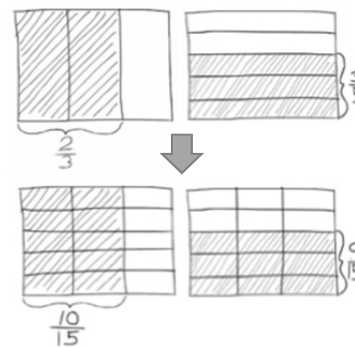
S: 10 tenths plus 3 tenths equals 13 tenths. 10 tenths makes a whole and 3 tenths is left over. The answer is 1 and 3/10.

### Problem 3

T: Let's try another. This time, both numerators are greater than one, so make sure your brackets are clear. Draw your model only. Put your pencil down when you are finished drawing the model. (Allow 1-2 minutes to draw. When all pencils are down, continue.)

$$\frac{2}{3} + \frac{3}{5} =$$

T: Discuss with your partner what you bracketed and why. I will be circulating to check for your understanding.



Allow 1 minute for students to discuss. Walk around and observe drawings and conversations. Then proceed with questioning as before to arrive at the following.

$$\frac{2}{3} + \frac{3}{5} = \frac{10}{15} + \frac{9}{15} = \frac{19}{15} = \frac{15}{15} + \frac{4}{15} = 1 + \frac{4}{15} = 1\frac{4}{15}$$

T: What can we do to make our answer easier to understand?

S: Write it as a mixed number.

T: Do that now individually. (Allow 1 minute to work.) Compare your work with your partner. What is our final answer of 2 thirds plus 3 fifths?

S: 1 and 4 fifteenths.

## Problem 4

T: For our last problem today I want you to solve it on your own first. Draw a model and use a number sentence. Once everyone is finished we will check your work.

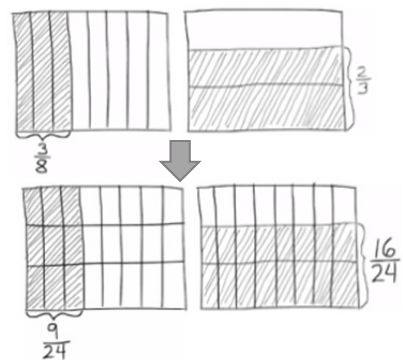
$$\frac{3}{8} + \frac{2}{3} =$$

T: (Allow time for students to work, about 3 minutes.) When finding like units of eighths and thirds, what unit did you find?

S: 24.

T: Say your addition sentence using twenty-fourths.

S: 9 twenty-fourths plus 16 twenty-fourths equals 25 twenty-fourths.



$$\frac{3}{8} + \frac{2}{3} = \frac{9}{24} + \frac{16}{24} = \frac{25}{24}$$

T: Change 25/24 to a mixed number. Jerry can you share how to do that?

S: 25 twenty-fourths = 24 twenty-fourths + 1 twenty-fourth.

$$\frac{25}{24} = \frac{24}{24} + \frac{1}{24}$$

T: What does 24 twenty-fourths make, everyone?

S: 1 whole.

T: Say the final answer to 3 eighths plus 2 thirds.

S: 1 and 1 twenty-fourth.

$$\frac{25}{24} = \frac{24}{24} + \frac{1}{24} = 1\frac{1}{24}$$

## Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

## Student Debrief (10 minutes)

**Lesson Objective:** Add fractions with sums between 1 and 2.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

T: Have your Problem Set ready to correct. I will say the addition sentence. You say the answer as a mixed number. Problem a) 2 thirds plus 1 half?

S: 1 and 1 sixth.

Continue giving answers to the entire Problem Set.

T: I am going to give you 2 minutes to talk to your partner about any relationships you noticed on today's Problem Set. Be specific. I will be circulating to hear your conversations.

Allow for students to discuss. Then proceed with a similar conversation to the one below.

T: Ryan, I heard you talking about Problems (a) and (c). Can you share what you found with the class?

S: I saw that both problems used 1 half. So I compared the second fraction, and saw that they used  $\frac{2}{3}$  in Problem (a) and  $\frac{3}{5}$  in Problem (b). I remember from comparing fractions last year

NYS COMMON CORE MATHEMATICS CURRICULUM 5•3

Name Jaqueline Date \_\_\_\_\_

1) For the following problems, draw a picture using the rectangular fraction model and write the answer. When possible, write your answer as a mixed number.

a)  $\frac{2}{3} + \frac{1}{2} = \frac{4}{6} + \frac{3}{6} = \frac{7}{6} = 1\frac{1}{6}$

b)  $\frac{3}{4} + \frac{2}{3} = \frac{9}{12} + \frac{8}{12} = \frac{17}{12} = 1\frac{5}{12}$

c)  $\frac{1}{2} + \frac{3}{5} = \frac{5}{10} + \frac{6}{10} = \frac{11}{10} = 1\frac{1}{10}$

d)  $\frac{5}{7} + \frac{1}{2} = \frac{10}{14} + \frac{7}{14} = \frac{17}{14} = 1\frac{3}{14}$

e)  $\frac{3}{4} + \frac{1}{6} = \frac{18}{24} + \frac{4}{24} = \frac{22}{24} = 1\frac{11}{12}$

f)  $\frac{2}{3} + \frac{3}{7} = \frac{14}{21} + \frac{9}{21} = \frac{23}{21} = 1\frac{2}{21}$

COMMON CORE Lesson 4: Add Fractions with Sums Between One and Two Date: 6/25/13 engage<sup>ny</sup> 3.B.27

NYS COMMON CORE MATHEMATICS CURRICULUM 5•3

Solve the following problems. Draw a picture and/or write the number sentence that proves the answer. Simplify your answer.

2) Penny used  $\frac{2}{5}$  lb of flour to bake a vanilla cake. She used another  $\frac{3}{4}$  lb of flour to bake a chocolate cake. How much flour did she use altogether?

Carlos wants to practice piano 2 hours each day. He practices piano for  $\frac{3}{4}$  hour before school and  $\frac{7}{10}$  hour when he gets home. How many hours has Carlos practiced piano? How much longer does he need to practice before going to bed in order to meet his goal?

Penny used  $1\frac{2}{20}$  pounds of flour to bake her cakes.

Carlos has practiced  $1\frac{9}{20}$  hrs and has  $\frac{11}{20}$  hour to go to make his goal.

COMMON CORE Lesson 4: Add Fractions with Sums Between One and Two Date: 6/25/13 engage<sup>ny</sup> 3.B.28



that  $\frac{2}{3}$  is greater than  $\frac{3}{5}$ . It is really close.  $\frac{2}{3}$  is  $\frac{10}{15}$  and  $\frac{3}{5}$  is  $\frac{9}{15}$  and so the answers for (a) and (c) also show that (a) is greater than (c) because (a) adds  $\frac{2}{3}$ .

T: Thank you Ryan. Can someone else share please?

S: I noticed that every single fraction on this Problem Set is greater than or equal to one half. That means when I add two fractions that are greater than one half together, my answer will be greater than 1. That also means that I will have to change my answer to a mixed number.

T: Thank you. Now I will give you 1 minute to look at Jacqueline's work. What tool did she use to convert her fractions greater than 1 to mixed numbers?

S: Number bonds!

T: Turn and talk to your neighbor briefly about what you observe about her use of number bonds and how that compared with your conversion method.

T: What tool did you use to convert your fractions into like units?

S: The rectangle model.

T: (After students share.) How does this work today relate to our work yesterday?

S: Again, we took larger units and broke them into smaller equal units to find like denominators. → Yesterday all our answers were less than 1 whole. Today we realized we could use the model when the sum is greater than 1. → Our model doesn't show the sum of the units, it just shows us the number of units that we need to use to add. → Yeah, that meant we didn't have to draw a whole other rectangle. → I get it better today than yesterday. Now I really see what is happening.

T: Show me your learning on your exit ticket!

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.



Name \_\_\_\_\_

Date \_\_\_\_\_

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. When possible, write your answer as a mixed number.

a)  $\frac{2}{3} + \frac{1}{2} =$

b)  $\frac{3}{4} + \frac{2}{3} =$

c)  $\frac{1}{2} + \frac{3}{5} =$

d)  $\frac{5}{7} + \frac{1}{2} =$

e)  $\frac{3}{4} + \frac{5}{6} =$

f)  $\frac{2}{3} + \frac{3}{7} =$



Name \_\_\_\_\_

Date \_\_\_\_\_

Draw a model to help solve the following problems. Write your answer as a mixed number.

1.  $\frac{5}{6} + \frac{1}{4} =$

2. Patrick drank  $\frac{3}{4}$  liter of water Monday before going jogging. He drank  $\frac{4}{5}$  liter of water after his jog. How much water did Patrick drink altogether? Write your answer as a mixed number.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Directions: For the following problems, draw a picture using the rectangular fraction model and write the answer. When possible, write your answer as a mixed number.

a)  $\frac{3}{4} + \frac{1}{3} =$

b)  $\frac{3}{4} + \frac{2}{3} =$

c)  $\frac{1}{3} + \frac{3}{5} =$

d)  $\frac{5}{6} + \frac{1}{2} =$

e)  $\frac{2}{3} + \frac{5}{6} =$

f)  $\frac{4}{3} + \frac{4}{7} =$

